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Title: ATOMIC ARMOR FOR OPTOELECTRONICS AND ACCELERATOR TECHNOLOGIES

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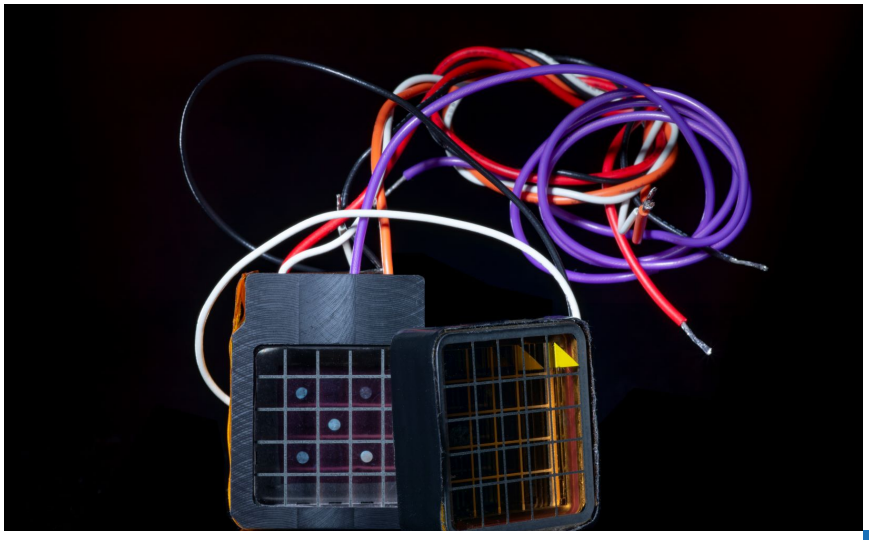

Tech Snapshot

Advanced Materials

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ATOMIC ARMOR FOR OPTOELECTRONICS AND ACCELERATOR TECHNOLOGIES

Atomically thin protection against gases that transmits electrons and light

SUMMARY

Researchers at Los Alamos National Lab have developed Atomic Armor that is the first and only “invisible” shielding for technological devices. This one-atom-thick coating allows transmission of electrons and photons while blocking undesired gas molecules, thus extending a device’s lifetime while maximizing its functionality. It is the thinnest, most durable, most flexible, and customizable shielding ever made. The technology has been recognized with a R&D 100 Award and a Gold Special Recognition Award for Market Disruptor - Products.

MARKET

Optoelectronics such as photocathodes, solar cells, and light-emitting diodes that require protection from the surrounding environment (i.e. undesired gases such as oxygen molecules and moisture) to enhance device lifetime and reliability, while allowing electron and light transmission for their operations. Application areas of photocathodes include accelerator technologies and high-sensitive imaging devices.

BENEFITS

Atomic Armor is the solution for modern technologies that need thin shielding. The "Material by Design" approach allows it to fill the void in technology advancement for photocathodes, advanced colliders, and technologies of tomorrow.

- Ultra-thin protective shield is only one-atom thick
- Blocks gases while trasmitting electrons and photons
- Chemically inert
- Extends device lifetimes
- Applicable to the most-challenging substrates
- Flexible coating
- Coats 3-D shapes
- Can enhance material or device performance

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WHY WE ARE BUILDING ATOMIC ARMOR FOR OPTOELECTRONICS AND ACCELERATOR TECHNOLOGIES

Shielding material balances desirable protection with minimal impact to functionality and performance: weight, flexibility, strength, chemical reactivity, repel, or thickness. In other words, most shielding materials impede the performance of the device. Atomic Armor does not. It allows electrons and photons to pass through, while blocking carbon dioxide and oxygen molecules. This is not possible even with thinnest shielding materials currently available on market.

WHAT'S BEHIND OUR TECHNOLOGY

Atomic Armor is based on atomically thin crystals and exemplifies “Material by Design” by blocking the damaging interaction with gas molecules while allowing electrons and photons to pass through the shield. This breakthrough in designing new materials to accomplish specific functions impacts optoelectronics, including photocathodes that have suffered for decades as researchers searched for suitable shielding materials that would allow electron penetration.

OUR COMPETITIVE ADVANTAGES

Atomic Armor "completely" frees product designers from the typical shielding trade-offs in ruggedizing devices. No other materials have succeeded in achieving this. Atomic Armor is thin (a single-atom layer), flexible (fully foldable), durable (no cracking or peeling), and capable of passivating even reactive materials. It permits electrons and light through the shield, which is critical for some optoelectronics, while keeping out gases that could damage the device via chemical reactions.

OUR TECHNOLOGY STATUS

Our technology is matured to the point where product development can be initiated to coat specific target surfaces required by customers. The majority of development effort will be on how to increase the coating yield for the production/manufacturing because processes will depend on a type of target material, surface roughness and geometry, chemical reactivity, and size. Such development may be pursued through a licensing agreement or through collaborative R&D under a CRADA.

PUBLICATIONS AND IP

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